NEW UTILITY PATENT APPLICATION TRANSMITTAL

☐ **DUPLICATE**

Address to:	Attorney Docket No.	EM/YANG/5037
Assistant Commissioner for Patents **Box PATENT APPLICATION** **Washington, DC 20231**	First Named Inventor (or identifier)	YANG et al.
	Total Pages	27

This submits a new application under 37 CFR 1.53(b).

Entitled: TIME-DIVISION METHOD FOR PLAYING MULTI-CHANNEL VOICE SIGNALS

☒ 1. Submitted herewith are the following:

_11_ pages of specification, including an Abstract,
_4_ sheet(s) of drawings, and
_12 claim(s).

☒ 2. Submitted herewith is an Oath/Declaration signed by each inventor.

☒ 3. Submitted herewith are the following:
- ☐ __ signed Independent Inventor Small Entity Statement(s),
- ☒ _1_ signed Small Business Small Entity Statement(s),
- ☐ __ signed Non-Profit Small Entity Statement(s).
- ☐ __ signed Non-Inventor Small Entity Statement(s),

☐ 4. A preliminary amendment is enclosed.

☐ 5. Submitted herewith is an Information Disclosure Statement, ___ pages of Form PTO-1449, and one copy of each document listed thereon.

☒ 6. An assignment of the invention to Realtek Semiconductor Corp.

☐ 7. A certified copy of application no. _____ in _____.

☒ 8. The Commissioner is authorized to credit any over payment and charge any deficiency in any fees required under 37 CFR 1.16, 1.17 and/or 1.18, to Deposit Account No. 02-0200.

☒ 9. A check in the amount of $ 420.00 is submitted herewith.

☐ 10. Other:_____

THE FILING FEE IS CALCULATED AS FOLLOWS:				Basic Fee:	$760.00
Total Claims:	12	- 20 =	0	X $18 =	$0.00
Independent Claims:	3	- 3 =	0	X $78 =	$0.00
				Multiple Dependent Claim (add $260.00):	
				Subtotal:	$760.00
				50% Reduction if Small Entity Status:	$380.00
				Total:	$380.00

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Date:	Name:	Signature:	Reg. No.
October 7, 1999	Eugene Mar		25,893

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VERIFIED STATEMENT (DECLARATION) BY A SMALL BUSINESS CLAIMING SMALL ENTITY STATUS UNDER *37 CFR 1.9(F) AND 1.27(b)*

Applicant or Patentee: Brian YANG, Kuo-hsiang CHEN & Fu-yuan CHENG	Docket #:
Serial or Patent Number:	Group Art Unit:
Filed or Issued:	Examiner:
Title: TIME-DIVISION METHOD FOR PLAYING MULTI-CHANNEL VOICE SIGNALS	

I hereby declare that I am

☒ the owner of the small business concern identified below:

☐ an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Concern: Realtek Semiconductor Corp.

Address: No. 2, Industry E. Road IX, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the matter described in:

☒ The specification filed herewith, with the title as listed above.

☐ The patent application identified above.

☐ The PCT international patent application identified above.

☐ The patent number identified above.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention must file separate verified statements averring to their status as small entities, and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under *37 CFR 1.9(c)* if that person made the invention, or by any concern who would not qualify as a small business concern under *37 CFR 1.9(e)*. Each person or organization having any rights in the invention is listed below:

☒ no such person, concern or organization.

☐ each such person, concern or organization listed below.

FULL NAME:	☐ Individual
ADDRESS:	☐ Small Business Concern ☐ Nonprofit Organization

FULL NAME:	☐ Individual
ADDRESS:	☐ Small Business Concern ☐ Nonprofit Organization

☐ See attached sheet for additional person(s) concern(s) or organization(s).

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate *(37 CFR 1.28(b))*.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under *section 1001 of Title 18 of the United States Code*, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which the verified statement is directed.

Name and Title Po-len YEH	*Date* Sept. 14, 1999
Address No. 2, Industry E. Road IX, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.	*Signature* Po-len Yeh

TIME-DIVISION METHOD FOR PLAYING MULTI-CHANNEL VOICE SIGNALS

BACKGROUND OF THE INVENTION

A. Field of the Invention

The invention relates to a synthesizing method of multi-channel voice signals. In particular, the invention relates to a synthesizing method, which utilizes time-division theory, capable of playing multi-channel voice signals with good voice qualities and easily adjusting the ratio of voice signals.

B. Description of the Prior Art

Conventionally, voice signals can be played via digital/analog conversion (DAC) or pulse width modulation (PWM) in consumer ICs. Synthesis of the multi-channel voice signals can be implemented by current summing or by using adder.

FIG. 1 is a block diagram showing a circuitry for playing four-channel voice signals by using DAC method and current summing. With reference to FIG. 1, the four channels 16 each has an associated voice data generator 11 and an associated D/A converter 12. When the four-channel voice is to be played, each voice data generator 11 generates a voice data that will be converted into an analog signal by the associated D/A converter 12. Then, the output signals of the D/A converters 12 are wire-anded and thus current summing is performed. The summed signal

is amplified by a power amplifier 14 and then sent to a speaker 15 to generate the multi-channel voice.

Good voice qualities can be obtained when using the above-mentioned method to play multi-channel voice. However, the disadvantage is that similar circuit unit (DAC circuit) needs to be provided for each channel. Consequently, the entire circuitry will occupy a large area.

FIG. 2 is a block diagram showing a circuitry for playing four-channel voice signals by using an adder. When four-channel voice signals are to be played, the voice data generator 21 of each channel generates a voice data. Then, the two least significant bits of the voice signal in each channel are removed (that is, divide by four), and the voice signal is sent to an adder 22 to obtain a summed data. The summed data are then sent to a D/A converter 23 to be converted into an analog signal. The analog signal is amplified by a power amplifier 24 and then sent to a speaker 25 to generate the multi-channel voice.

The associated disadvantages of the method are that it requires an extra adder circuit and the resolutions of voices are lowered.

FIG. 3 is a block diagram showing a conventional circuitry for playing four-channel voice signals by using a PWM method and current summing. When multi-channel voice is to be played, the voice data generator 31 of each channel generates a respective voice signal. Then, each voice signal is sent to a PWM voice generator 32. Conventionally,

the PWM voice generator 32 includes a high-speed counter and a switch. According to the positive phase or negative phase of sound wave, each PWM voice generator 32 converts the associated voice signal into two binary bits, and represents the voice volume by pulse width. Subsequently, the first bit BIT1 and the second bit BIT2 of the output of each channel are wire-anded such that current summing are implemented. The summed signals are sent to a speaker 34 to generate voices.

A disadvantage for playing multi-channel voices using a PWM method and current summing is that similar sound generator circuit unit needs to be provided for each channel. Consequently, the entire circuitry occupies a large area. Moreover, since each output is connected to each other, the output current of each channel flows to other channels, which results in waste of power.

FIG. 4 is a block diagram showing a conventional circuitry for playing four-channel voice signals by using a PWM method and an adder. When the four-channel voice signals are to be played, each voice data generator 41 generates a voice signal. Next, two least significant bits of the voice signal in each channel are removed (that is, divided by four) and then sent to an adder 42 to obtain a summed data. Subsequently, the summed data are sent to a PWM voice generator 43, which includes a high-speed counter and a switch. The output of the PWM voice generators 43 is sent to a speaker 44 for generating voices.

The associated disadvantages of this method is that it requires an extra adder circuit and the resolutions of voices are lowered because

synthesis of the four-channel voice signals is based on average pulse width of each channel.

The approaches as described above cannot provide excellent synthesis of multi-channel voice signals. In view of this, a time-division multiplexing (TDM) method, which is widely used in communication systems, is utilized to play multi-channel voice signals, thereby solve the above-mentioned problems.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a time-division method for playing multi-channel voice signals, thereby improve voice qualities of the multi-channel voice signals.

In accordance with the present invention, the time-division method for playing multi-channel voice signals comprises the following steps:

(1) Each voice data generator generates a voice signal of an associated channel.

(2) Under the control of a set of periodical channel selecting signals, a channel selector is utilized to successively sample the voice signals of the channels such that a time-division signal comprising periodically alternative voice signal can be generated. The sampling rate is that each channel is sampled once per cycle.

(3) The channel selector sends the time-division signal without being demodulated to a voice generator including a power amplifier, for driving a speaker to generate voices.

(4) Voice volume can be adjusted by adjusting numbers of channels being occupied by that voice, thereby achieves the effect of mixing voices.

The first feature of the present invention is that after several voice signals are subject to time-division sampling, the voice signals are directly inputted to a subsequent voice generator without being demodulated, thereby achieves the effect of mixing voices. The second feature is that the ratio of a specific voice signal in the synthesized voice can be adjusted by changing the numbers of channels occupied by that voice signal.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention will become apparent by reference to the following description and accompanying drawings, wherein:

FIG. 1 is a block diagram showing a circuitry for playing four-channel voice signals using a DAC method and current summing;

FIG. 2 is a block diagram showing a circuitry for playing four-channel voice signals using a DAC method and an adder;

FIG. 3 is a block diagram showing a circuitry for playing four-channel voice signals using a PWM method and current summing;

FIG. 4 is a block diagram showing a circuitry for playing four-channel voice signals using a PWM method and an adder;

FIG. 5 is a schematic diagram showing a conventional system of a time-division multiplexing method;

FIG. 6 is a block diagram showing a circuitry for playing four-channel voice signals using a time-division multiplexing method according to an embodiment of the present invention;

FIG. 7 is a diagram showing the waveform of a channel selecting signal S_C which comprises two periodical signals S_{f1} and S_{f2};

FIG. 8 is a block diagram showing a conventional PWM voice generatorry.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

To better understand the spirit of the present invention, a conventional time-division method, which is widely applied to various communication systems, is explained hereinafter.

FIG. 5 shows a conventional communication system which utilizes a time-division multiplexing method. As shown in FIG. 5, four voice signals X_1~X_4 are respectively pre-filtered by low pass filters LPF1~LPF4, and then sent to a transmitter 52. Subsequently, in the transmitter 52, a multiplexer (not shown), which receives the four output signals of the low pass filters LPF1~LPF4 as its input signals, samples each input signal once per switching cycle. Therefore, the output signal of the transmitter 52 has a waveform of pulse amplitude modulation (PAM), wherein the periodically alternative sampled signals are included.

These signals are sent to a receiver 54 via a transmission channel 53. In the receiver 54, a demultiplexer (not shown), which receives the signal from the transmission channel 53 as its input signal, divides the received signal into four signals and sends them to four low pass filters LPF1'~LPF4' respectively. Finally, four output signals X_1'~X_4', which represent the four original voice signals can be derived. In theory, if each voice signal has the same bandwidth, then a sampling frequency larger than or equal to two times of the bandwidth can be utilized.

The time-division method for playing multi-channel voice signals according to the present invention is based on the above-mentioned time-division multiplexing method.

FIG. 6 is a block diagram showing a circuitry for playing four-channel voice signals with eight-bits resolutions by using a time-division method according to the present invention. Referring to FIG. 6, each one of the voice data generators 61 generates an eight-bits voice signal Si (i=1,2,3,4), respectively. Since the most significant bit (MSB) of each of the voice signals Si (i=1,2,3,4) can be "0" or "1", each of these voice signals S1~S4 has a positive half cycle and a negative half cycle. The remaining seven bits represent the envelope of the associated voice signal (or the amplitude of the associated voice signal).

On the other hand, a two-bits channel selecting signal S_C is sent to the channel selector 62. In this embodiment, the channel selecting signal S_C consists of two synchronous periodical signals S_{f1} and S_{f2}, which respectively have frequencies of f_1 kHz and f_2 kHz ($f_2 = 2f_1$), as illustrated

in FIG. 7. Accordingly, four different states of the channel selecting signal S_C can be obtained, as illustrated in table 1.

State of signal S_C	Signal S_{f1}	Signal S_{f2}
State 1	"1"	"1"
State 2	"1"	"0"
State 3	"0"	"1"
State 4	"0"	"0"

Table 1

If the states 1~4 of the signal S_C corresponds to each of the voice data generators 1~4, the channel selector 62 can sample the output signals S1~S4 of the voice data generators 61 once per sampling cycle under the control of the channel selecting signal S_C. Subsequently, the channel selector 62 directly outputs sampled signals S_d (MSB) which is periodically alternative and envelop signals S_0~S_6 to a voice generator 63 (by using a DAC method or a PWM method).

Taking the PWM voice generatorry as an example, the method for driving voice generator using the sampling signals (S_d (MSB) and S_0~S_6) are illustrated as follows. FIG. 8 is a block diagram showing a conventional PWM voice generatorry. With reference to FIG. 8, the one-bit voice signal S_d(MSB) and seven-bits voice signal S_0~S_6 outputted from the channel selector 62 are sent to a high speed counter 9 and a switch 8 of the PWM voice generator, respectively. The envelope signal

S_0~S_6 is connected to the input terminal of the high speed counter 9, wherein a control signal C_r is used to control the counting of the high speed counter 9. The overflow signal of the high-speed counter 9 is used for generating a high frequency pulse S_{se}, whose width represents amplitude of the voice signals. Subsequently, the high frequency pulse S_{se} is sent to a switch 8. Under the control of S_d(MSB), the switch 8 separates the high frequency pulse S_{se} into a positive half cycle signal SS_{sp1} and a negative half cycle signal SS_{sp2} that represent the voice in that period. Finally, the signals SS_{sp1} and SS_{sp2} are sent to a speaker 7 to directly drive the speaker 7 to generate voices.

If several input channels are connected to one voice source, or several channels are distributed to a particular voice source, then amplitudes of the voice signals (speech or music) can be adjusted. Consequently, volume can be easily controlled and numbers of channels occupied by a specific voice signal can be easily adjusted.

As illustrated in the above embodiment, by using the time-division multiplexing method to play multi-channel voice signals in accordance with the present invention, the problem that several sets of voice generators are required and thus occupies a large area when current summing is utilized can be avoided. Besides, the problem of a deteriorated resolution caused by incorporating an adder can be avoided as well. Moreover, no extra circuit is needed since the ratio of a specific voice in the multi-channel voices can be adjusted by controlling numbers of channels occupied by a specific voice signal.

While the present invention has been described with reference to the specific embodiments, the description is only illustrative and is not to be construed as limiting the invention. For example, the numbers of channels are not limited to four. Moreover, the time-division method can be applied to a voice generator, which uses only DAC method or any other types of voice generators.

What is claimed is:

1. A time-division method for playing multi-channel voice signals, comprising the steps of:

inputting each of a plurality of multi-channel control signals to a corresponding voice data generator, said voice data generator generating a voice signal containing said multi-channel control signal;

under the control of one set of periodical channel selecting signal, utilizing a channel selector to successively sample said plurality of voice signals with a sampling rate that each channel is sampled once per cycle to generate a time-division signal containing periodically alternative voice signals;

said channel selector directly sending said time-division signal without being demodulated to a voice generator including a power amplifier, the output of said voice generator then driving a speaker to generate voices.

2. A time-division method as claimed in claim 1, wherein said plurality of channels is utilized to play melody or speech.

3. A time-division method as claimed in claim 1, wherein said channel selecting signal has a plurality of states during each cycle, each of said plurality of states corresponds to an associated channel.

4. A time-division method as claimed in claim 1, wherein a plurality of said voice signals inputted to said channel selector come from one voice source so as to enhance volume of said voice.

5. A time-division method for playing multi-channel voice signals

using a digital/analog conversion method, comprising the steps of:

inputting each of a plurality of multi-channel control signals to an associated multi-channel voice data generator, said voice data generator generating a voice signal containing said multi-channel control signal;

under the control of one set of periodical channel selecting signal, utilizing a channel selector to successively sample said plurality of voice signals with a sampling rate that each channel is sampled once per cycle to generate a time-division signal containing periodically alternative multiple-bits envelope data; and

said channel selector directly sending said time-division signal without being demodulated to a voice generator including a digital/analog converter for converting said digital time-division signals into an analog time-division signals, said analog time-division signals then being power-amplified and sent to a speaker for driving it to generate voices.

6. A time-division method as claimed in claim 6, wherein said multi-channels is utilized to play melody or speech.

7. A time-division method as claimed in claim 6, wherein each of said channel selecting signals has a plurality of states during each cycle, each of said plurality of states corresponds to an associated channel.

8. A time-division method as claimed in claim 6, wherein a plurality of said voice signal inputted to channel selector come from one voice source so as to enhance volume of said voice.

9. A time-division method for playing multi-channel voice signals

using a pulse width modulation method, comprising the steps of:

inputting each of a plurality of multi-channel control signals to an associated multi-channel voice data generator, said voice data generator generating a voice signal containing said multi-channel control signal;

under the control of one set of periodical channel selecting signal, utilizing a channel selector to successively sample said plurality of voice signals with a sampling rate that each channel is sampled once per cycle to generate a time-division signal containing periodically alternative multiple-bits envelope data; and

said channel selector directly sending said time-division signal without being demodulated to a voice generator including a high speed counter and a switch, such that said digital time-division signals being modulated with a high-frequency pulse width, and separating said digital time-division signals into positive half cycle signals and negative half cycle signals with zero current as reference level, then said positive half cycle signals and negative half cycle signals being sent to drive a speaker for generating voices.

10. A time-division method as claimed in claim 11, wherein said multi-channels is utilized to play melody or speech.

11. A time-division method as claimed in claim 11, wherein each of said channel selecting signals has a plurality of states during each cycle, each of said plurality of states corresponds to an associated channel.

12. A time-division method as claimed in claim 11, wherein a plurality of said voice signal inputted to channel selector come from one

voice source so as to enhance volume of said voice.

ABSTRACT

A time-division method for playing multi-channel voice signals is provided to improve voice qualities of the multi-channel voice signals. The first feature of the present invention is that after time-division sampling, the voice signals can be directly sent to a subsequent voice generator without being demodulated beforehand. The second feature is that the ratio of a specific voice signal to a synthesized voice can be easily adjusted by changing the numbers of channels occupied by the specific voice. Consequently, the adjusting circuitry can be significantly simplified.

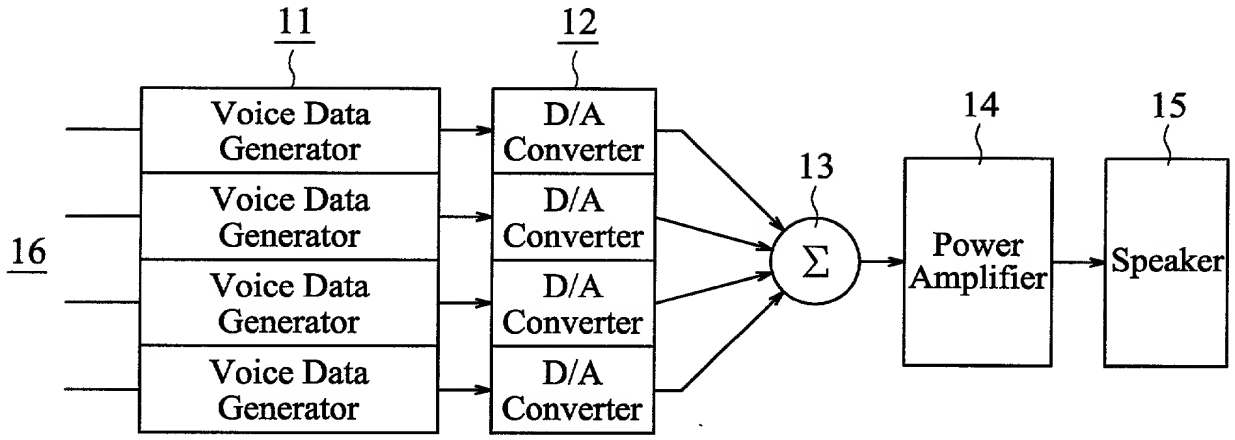

FIG. 1
(PRIOR ART)

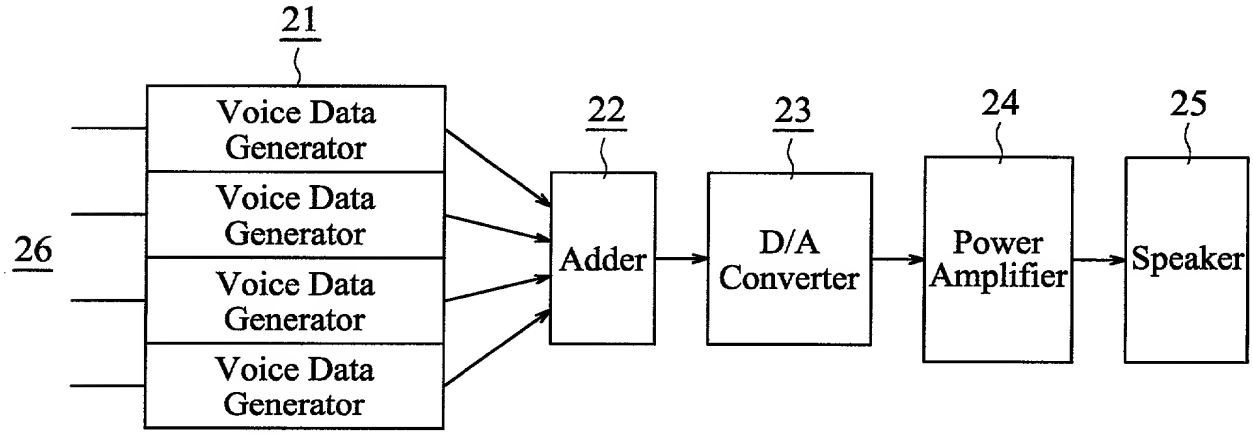

FIG. 2
(PRIOR ART)

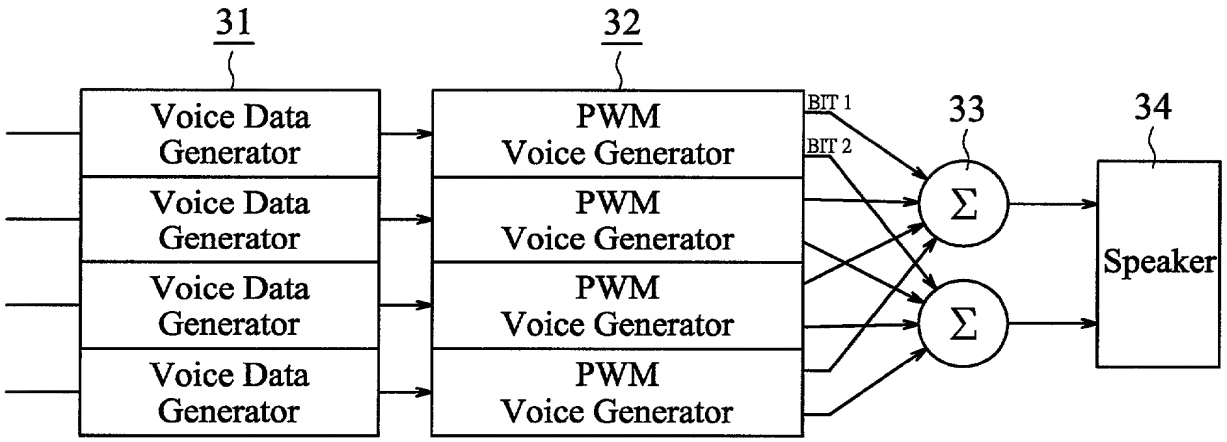

FIG. 3
(PRIOR ART)

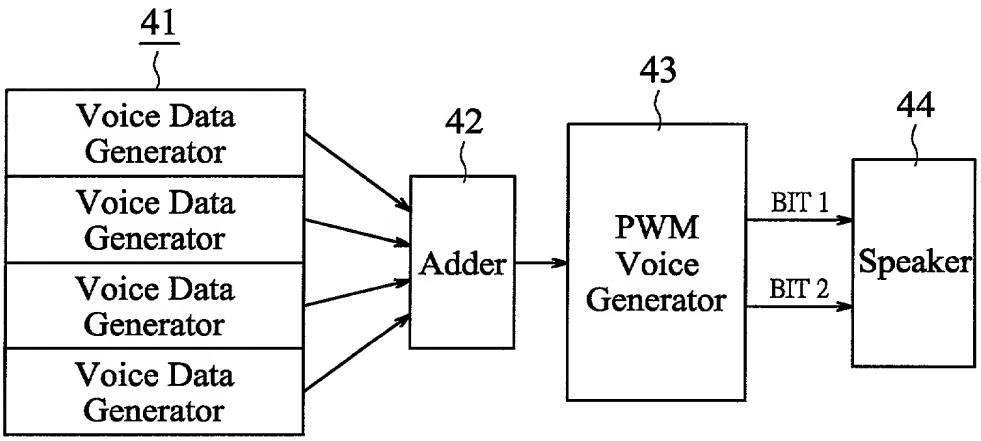

FIG. 4
(PRIOR ART)

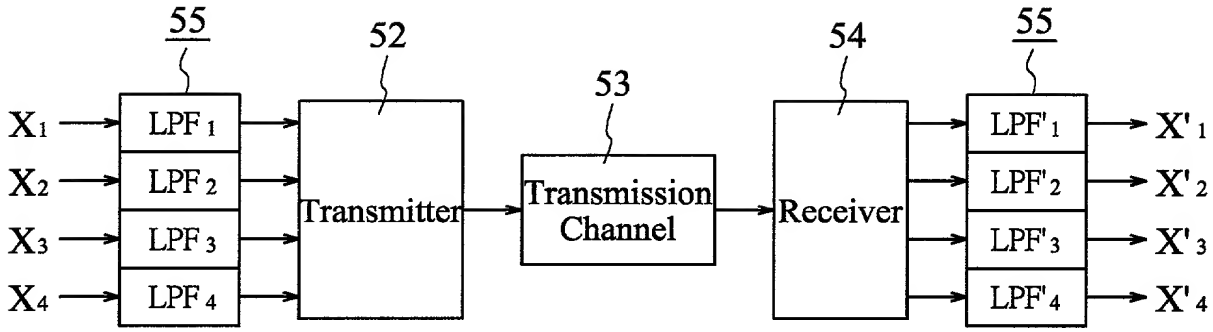

FIG. 5
(PRIOR ART)

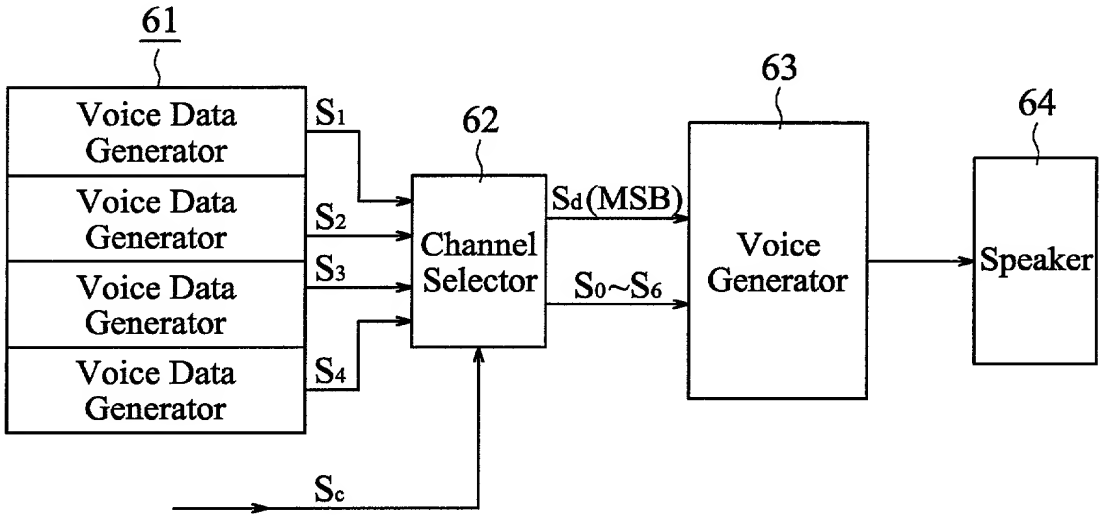

FIG. 6

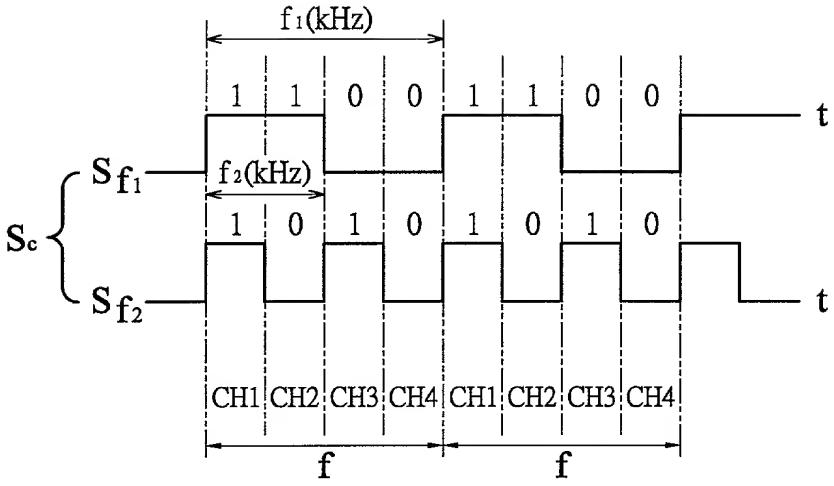
f1(kHz)
1 1 0 0 1 1 0 0
t
Sc
Sf1
f2(kHz)
1 0 1 0 1 0 1 0
Sf2
t
CH1 CH2 CH3 CH4 CH1 CH2 CH3 CH4
f
f

FIG. 7

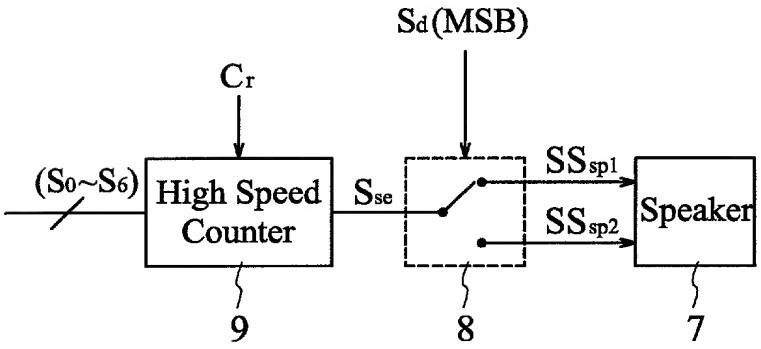
Sd(MSB)
Cr
(S0~S6)
High Speed Counter
Sse
SSsp1
SSsp2
Speaker
9
8
7

FIG. 8

DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled:

TIME-DIVISION METHOD FOR PLAYING MULTI-CHANNEL VOICE SIGNALS

the specification of which (check one):

☒ is attached hereto, or ☐ was filed on: as U.S. Application Number of PCT International Application Number:

and (if applicable) was amended on:

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations,§ 1.56.* I hereby claim foreign priority benefits under *Title 35, United States Code § 119* of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)			PRIORITY CLAIMED	
Number	**Country**	**Day/Month/Year Filed**	**Yes**	**No**
88112839	Taiwan	27/7/1999		X

☐ Additional Priority Application(s) Listed on Following Page(s)

I HEREBY CLAIM THE BENEFIT UNDER TITLE 35 U.S. CODE § 119(E) OF ANY U.S. PROVISIONAL APPLICATIONS LISTED BELOW.	
Application Number	**Day/Month/Year Filed**

☐ Additional Provisional Application(s) Listed on Following Page(s)

I hereby claim the benefit under *Title 35, United States Code*, § *120* of any United States application(s) or PCT international application(s) designating The United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of *Title 35, United States Code*, § *112*, I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations,§ 1.56* which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Number	Filing Date	Status - Patented, Pending or Abandoned

☐ Additional US/PCT Priority Application(s) Listed on Following Page(s)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willfull false statements and the like so made are punishable by fine or imprisonment, or both, under *section 1001 of title 18 of the United States Code* and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: I (We) hereby appoint as my (our) attorneys, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: J. Ernest Kenney, Reg. Mo. 19,179; Eugene Mar, Reg. No.25,893; Richard E. Fichter, Reg. No. 26,382; Charles R. Wolfe, Jr., Reg. No. 28,680; Thomas J. Moore, Reg. No. 28,974; Bruce H. Troxell, Reg. No. 26,592; and

I(we) authorize my(our) attorneys to accept and follow instructions from **JOU AND LIN International Patent Office** regarding any matter related to the preparation, examination, grant and maintenance of this application, any continuation, continuation-in-part or divisional based thereon, and any patent resulting therefrom, until I(we) or my(our) assigns withdraw this authorization in writing.

Send correspondence to: BACON & THOMAS
625 Slaters Lane - 4th Floor
Alexandria, VA 22314

Telephone Calls to:
(703) 683-0500

FULL NAME OF FIRST OR SOLE INVENTOR	CITIZENSHIP
Brian YANG	Taiwan, R.O.C.
RESIDENCE ADDRESS No. 2, Industry E. Road IX, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
DATE Sept. 14, 1999	SIGNATURE Brian Yang

☐ *See following page(s) for additional joint inventors.*

CONTINUATION OF DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

PRIOR FOREIGN APPLICATION(S) (35 USC§ 119)			PRIORITY CLAIMED	
Number	Country	Day/Month/Year Filed	Yes	No

PRIOR PROVISIONAL APPLICATIONS 35 U.S. CODE § 119(E)	
Application Number	Day/Month/Year Filed

PRIOR U.S. OR PCT INTERNATIONAL APPLICATIONS (35 U.S. CODE § 120)		
Application Number	Filing Date	Status - Patented, Pending or Abandoned

FULL NAME OF JOINT INVENTOR	CITIZENSHIP
Kuo-hsiang CHEN	Taiwan, R.O.C.
RESIDENCE ADDRESS No. 2, Industry E. Road IX, Science-Based Industrial Park, Hsinchu, Taiwan, R.O.C.	POST OFFICE ADDRESS IS THE SAME AS RESIDENCE ADDRESS UNLESS OTHERWISE SHOWN BELOW
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☐ *See following pages for additional joint inventors/priority applications*